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THE MEANING OF VISION-RELATED TERMS TO A BLIND CHILD

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To construct a realistic language learning theory, it seems necessary to have anchor information of three kinds: what input the child receives, what kinds of theory of language ("interim grammars") he constructs at various stages during the acquisition process, and what kind of theory of language (adult grammar) he finally constructs. Given these kinds of information it would become possible to make inferences about the initial representations in terms of which the child learns, and about the learning procedures that are involved. For some years, we have focussed attention on the first two of these questions. Our assumption, following Chomsky (1965) and Wexler and Culicover (1980), is that the relevant input to the learner is of two kinds: He requires sample strings of formatives from the language to which he is being exposed; and he requires that these strings be paired with interpretable extralinguistic information about the construal of these speech samples. Accordingly, we have been studying the course of language learning under conditions where that input varies.

In initial studies, we examined the sensitivity of learning to naturally occurring differences in maternal speech (Newport, Gleitman and Gleitman, 1977). The general finding was that the learning process is strikingly insensitive to variations in maternal speech style within the normal range of that variation. We take such findings to be a first indicant that learners are endowed with a skeletal framework for natural language, which allows them to override detailed differences in the speech input.

More recently, we have been studying learning in the presence of pathologies that restrict the input to the child much more severely. We first studied a population of deaf children of hearing parents who were not exposed to sign language, i.e., who were deprived of the normal samples of speech (and signing). These individuals construct idiosyncratic manual communication systems which develop in ways that mirror the normal course and timing of language acquisition (Feldman, Goldin-Meadow, and Gleitman, 1977), again supporting the view that learners of normal mental endowment are equipped with rudimentary schemata for language growth that survive environmental deprivation.

In the work summarized here, we examined what seems to be a symmetrical case of environmental deprivation, one in which the opportunity to receive extralinguistic information about the construal of input strings is severely reduced: the case of language learning in congenitally blind children (Landau, 1980, 1981; Landau and Gleitman, forthcoming). We studied three blind children over the whole course of their language learning (roughly, the period from 18 months through 5 years). Very often, these children do not know what is going on in the invisible scene around them, they exhibit extreme confusion about conversations and their intents, and (up to about age 36 months) often behave in ways that seem so bizarre that they are often called "autistic" (Fraiberg, 1977). Thus the evidence that blind children are experientially deprived in relevant ways is very strong. Our question is whether and how such deprivation affects the learning of language.

FINDINGS

The development of spontaneous speech in three blind children was compared to that for sighted children, using all measures now standard in the developmental psycholinguistic literature. After an initial mild delay, there was no discernible pathology in the rate or internal organization of this speech. Still, it is possible to suppose that the blind child's comprehension is restricted or deformed owing to the experiential deprivations (for this conjecture, see Bloom, 1983). To find out, we conducted an inquiry into how certain words, namely those that seem to encode vision and the visual experience, are understood by a young blind child. These include nouns such as photograph, verbs such as see, and adjectives such as green. These are the cases for which blind children's input circumstances seem to be maximally different from the input circumstances of their sighted peers. We restrict attention here to the blind child's meanings of vision-related verbs such as look, see and show.

It is well known that blind youngsters, including our own subjects, utter such words as early (at about age 30 months) and often as sighted youngsters. We conducted comprehension studies with a blind 3-year old and four blindfolded sighted control subjects of the same age, to discover what these verbs, as compared to haptic verbs (e.g., touch), meant to them. Summarizing the method, the subjects were asked to "look at" or "touch" various objects under various conditions, e.g., the child might be told to "Look behind you," or "Show the doll to mommy" or "Touch the doll" or even "Touch the table but don't look at it."

The outcomes are very clear from a variety of such manipulations. Both blind and sighted children distinguish between touch and look. For example, any of these subjects asked to "Touch the table" will reach toward it and contact it, usually by a tap or a bang on that object. Asked to "Look at the table," the blindfolded sighted subjects turn their covered eyes toward the object, i.e., they orient toward it visually. Even if commanded to "Look at the table with your hands," they apparently have no choice but to respond visually: They again turn their covered eyes toward the object, but this time also move their hands in some way, not a sensible way (e.g., they put their palms together, as if praying). In contrast, the blind subject told to "look" moves her hands toward the object--holding the head immobile--and then explores its surfaces by moving the hands all over them (in contrast with her response to "touch," where she only bangs or taps the object). Moreover, if told to "Touch the table but don't look at it" she bangs the table; then told "Now you can look at it," she proceeds to explore all its surfaces.

Such findings are consistent with the following interpretation. For both the blind and sighted subjects, touch means 'contact.' For both the blind and sighted subjects, look means 'explore by means of the dominant modality to determine objects.' In short, the findings lead to the view that blind and sighted 3 year olds mean something sensible, the same thing, by terms such as look. What differs is their "dominant modality"--the eye for sighted children and the hand for blind children. But despite this difference in the exploratory modality that is used to "achieve looking", all the children have extracted a construal of the term that has to do with their perceptual transactions with the world.

A further set of outcomes for the blind learner is worth noting. She evidently formed two construals for sight-related terms, one usable of herself, but another usable as the terms relate to sighted others. That is, we have evidence that the blind learner by age 36 months understands the following properties of "sighted seeing": (1) that it can be performed at a distance (e.g., an object is placed in the mother's hand in response to "Let mommy touch" or to "Give mommy" but is usually displayed at a distance in response to "Let mommy see" and "Show mommy"); (2) that it requires orientation of the line of sight (e.g., the blind child turns her body appropriately in response to "Let mommy see the back of your pants/front of your shirt" regardless of which way she was initially facing as the command was given); and (3) that it is blocked by a barrier (e.g., the blind child hides an object by placing her body between it and the mother when told to "Make it so mommy can't see").

THE ENVIRONMENT OF LEARNING

To determine the input conditions for these acquisitions, we examined 15 hours of videotaped sessions which consisted of the blind child's mother interacting naturally with the child, in the period (up to 36 months) before the learner was using look and see freely and frequently in conversation. We tested the plausible conjecture that the mother used look and see to the blind learner when an object was in the child's hand or at least within arm's reach, available for manual inspection. This hypothesis proved inadequate by itself to explain the learning, because almost all verbs commonly used to the blind child by her mother were uttered when the child had some target object in hand or near to hand. Thus this first description of the context for learning serves to distinguish the visual verbs from a few others (e.g., get and come) but leaves most of the verbs (e.g., look, play, and put) undifferentiated.

However, we were able to show that the syntactic environments of the common verbs, as used by the mother, provide a potentially rich source for further distinctions. For example, only look and see, among the common verbs, take sentential complements: The mother does say "Let's see if Granny's home" and "Look what Barbara brought" but she never says anything like "Let's put if Granny's home" or "Give what Barbara brought," while give and put, but not see, appear in three-term argument structures ("She gave the book to Mary" but not "She saw the book to Mary.") Such syntactic information, taken together with the information from the situational encodings (object "nearby"), is sufficient to distinguish each of the common verbs in the corpus from each of the others.

DISCUSSION

Based on our findings and these analyses, we put forward a description of verb learning that recruits both situational and linguistic-distributional evidence. We argue that syntactic formats for verbs are restricted by their construals, and thus provide a principled basis for the blind child's acquisition of the meaning of look and see. To take a single example, perception is of events as well as of objects, and thus perceptual verbs as used by the mother appear with sentential complements (e.g., "Let's see what kind of cheese you want" or "Look what I did") while such verbs as give never appear in such environments. If a learner is prepared to seek

and analyze for these distinctions of syntactic type as they correlate with available interpretations of the external world circumstance, a basis for learning seems to exist. We argue that an analysis in these terms has important virtues in understanding the development of verb meanings: For one thing, such a procedure accounts for our findings, while a simple analysis of "what was going on in the outside world" does not. Moreover, if syntactic information is recruited by the learning procedure, the required storage of word-to-event pairings is minimized as a factor in the learning process. Most important, the postulated storage of the verb frames is not merely a temporary prop for learning. It represents a relevant outcome of language learning: Every child must and does learn that one never says "Let's see a cracker to mommy" but can and does say "Let's give a cracker to mommy."

Summarizing, we hold that syntactic supports to language learning are useful because they are informative (each verb's formats are correlated with the semantic descriptions it encodes), because they are stable and categorical rather than probabilistic sources of evidence in the data base, and because their acquisition is required as a part of language learning whether or not they are taken to bear causally on that learning. More generally, the emerging competencies of blind children are another indication, supportive of our findings for normal children exposed to different maternal speech styles and for isolate deaf children, that learners have sufficient internal wherewithal to override differences and defects in the ambient extralinguistic circumstances, to acquire language normally.

INVITED ADDRESS: WORD RECOGNITION: A PARADIGM CASE FOR COMPUTATIONAL
(PSYCHO-) LINGUISTICS

Henry Thompson, University of Edinburgh

